

Date: January 30, 2009

DHCD WORK GROUP 1 2009 USBC ENERGY CODE REQUIREMENTS:

**Meeting: March 26, 2009 at DHCD 1st floor Board Room from 9:30 a.m. - 3:30 p.m.
501 North 2nd Street, Richmond, Virginia**

Welcome: Emory Rodgers, Deputy Director, DHCD

Introductions of attendees

Goals:

1. To produce consensus energy code changes from the I-Codes 2009 that were approved or denied and from individuals, code officials and associations/industry stakeholders for the BHCD to approve as part of the 2009 USBC. This can also include code changes from voluntary rating systems, voluntary standards and listing programs.
2. To have an inclusive, open and collaborative regulatory process that produces fair, reasonable, affordable and balanced code changes.
3. To strive for a 15% increase or more for the 2009 USBC and a 30% increase by the 2012 USBC in energy savings by these new code changes/requirements for new construction and rehabilitation of existing buildings.

Update on the Governor's Energy Policy Advisory Committee:

Questions:

1. Should the 2009 USBC mandate voluntary rating design systems such as for highrises or buildings over 200,000 square feet?
2. Can Virginia code officials and stakeholders support at ICC for the 2012 codes, the necessary code changes to reach the 30% energy saving goal by 2020 for the built environment?
3. Should the 2009 USBC require equipment and appliances installed under the USBC to meet Energy Star (EPA) listings such as cool roof systems or HVAC equipment?
4. Should HUD manufactured homes be required to comply with more stringent energy requirements?
5. How do we have better plan review, inspections and installation work done by building departments and builders/contractors/design professionals?

2009 I-Codes Technical Changes for the International Energy Conservation Code (IECC) and the International Residential Code (IRC):

1. EC 15: Approved requiring labeling of batts. A compressed batt loses R-1 or R-2 value. Administrative USBC may need statement to cover this being in IECC or IRC. Consensus to move forward?
2. EC18: Approved IRC glazing U-value at .35 instead of .40. Testimony debated impact on some products and why shouldn't it be the same as multi-family. One code change would have gone to .30. Consensus to move forward at .35?

3. EC33 and 36: Modest basement increases.
4. EC 45, 56 and 58: Approved to specifically detail trade-offs calculations can be used. Net effect to avoid gaming and save energy.
5. EC60: Approved extensive laundry list of air sealing locations that should assist in the new testing requirements. Consensus to move forward?
6. EC 64: Approved blower door testing or 3rd party inspection of air barrier. Consensus to move forward with both options?
7. EC68: Approved programmable thermostats with forced air furnaces. Estimate is 40% are using today for new construction. Consensus to move forward?
8. EC71: Approved requiring duct testing at close-in or post-construction. Consensus to move forward with both options?
9. EC74: Approved requiring increase in mechanical piping from R-2 to R-3. Consensus to move forward?
10. EC80: Approved snow melting systems to have automatic shut-offs. Consensus to move forward?
11. EC 82: Approved pool water heaters to have automatic shut-offs. Consensus to move forward?
12. EC 84 and 140: Approved requiring 50% of installed light fixtures be high efficacy lamps. Consensus to move forward?
13. EC91 and 99: Approved code changes for energy simulations for equipment efficiencies. No longer permits site energy use but utilizes energy cost or source. Consensus to move forward?
14. EC 92: Approved reducing amount of glazing from 18% to 15%, except keeps for multi-family 18% glazing. Consensus to move forward?
15. EC105, 106 and 110: Approved requirement that cannot mix and match IECC with ASHRAE 90.1 to game the avoidance of appropriate R-Values for insulation in attics and slabs. Consensus to move forward?
16. EC136: Approved requiring fan system control measures. Big energy saver and done in many buildings today, especially enclosed garages. Consensus to move forward?
17. EC137: Approved requiring outdoor heating to be radiant heating. Need to see if this will pose problems for restaurants using propane heaters (the most common form of heating for outdoor cafes/restaurants). Does USBC cover such outdoor heating systems? Consensus to move forward?
18. EC147: Approved requiring the allowance of 4 types of zones for exterior lighting that will save considerable energy. Review issues with USBC and law on some changes like this one where IECC zones maybe out of scope for USBC but can cover electrical and structure parts? Consensus to move forward?
19. IECC 14: Denied that was a comprehensive package of code changes for a 30% solution. Many preferred doing code changes individually resulting in about 15-20% savings being approved for the 2009 IECC. Are there changes to consider from this package?
20. EC16: Denied glazing U-factor from .40 to .35 for commercial and multi-family residential. There was a change to lower to .30, but that raised stout opposition on restriction of product. Discussion only.
21. EC27: IRC Denied increasing ceiling R-Value from 38 to 49 on basis of impact on framing and benefit for savings. Discussion only unless code change submitted.

22. EC 29: IRC Denied increasing frame wall R-13 to R-18 again based on framing would need to go from 2x4's to 2x6's in many cases depending on type of insulation materials used. Discussion only unless code change submitted.
23. EC 79: Denied requiring pilotless water heaters and denied IRC. Discussion only.
24. S23: Denied green roof system standard ANSI/SPRI. Can USBC cover all that might be in the standard? Can it be fixed and should it be included or wait until the 2012 cycle?
25. Above code term: USBC allows non-required systems and modifications for things meeting intent. Discussion only.
26. IRC Energy Chapter 11 review.
27. Above Code has to be coordinated with USBC regulatory concept as the USBC already allow any building systems and equipment to be used based upon standards or manufacturer's instructions so as not to create unsafe conditions.
28. Coordinate IECC with the IEBC and IBC/IEBC compliance alternative sections.

Review the 2009 International Plumbing, Fuel Gas and Mechanical Codes for energy conservation requirements. Bring back for the 3rd meeting for consensus.

Review the ICC/NAHB Green Standard, the ASHRAE 189 voluntary standard, EPA Energy Star listing of appliances, the LEED and Earthcraft rating systems. Bring back possible code changes for consensus.

Legislative Review:

1. State and local government buildings LEED ratings of silver?
2. Tax incentives for solar or other energy efficient designs?
3. Incentives for green roof systems?
4. Mandate irrigation systems are required to have sensors or use reclaimed, gray or rainwater harvesting?
5. Tax holidays for Energy Star products?

New business:

Next meeting date: April 23rd, 2009 at 9:30a.m., DHCD 1st floor boardroom.

Adjournment

Date: 3-9-09

Board of Housing and Community Development (BHCD), Fire Services Board (FSB) and BHCD's Codes and Standards Committee 2009 Regulatory Action and Meeting Dates:

These dates are subject to change

January 26, 2009: BHCD presented with 2009 regulatory schedule

March 23, 2009: BHCD approves Notice of Intended Regulatory Action (NOIRA)

May 18, 2009: BHCD's Codes and Standards Committee meet at approximately 11:00a.m to 4:00 at DHCD 1st floor board room right after the BHCD board meeting that will be from 9:30 to 11:00. Four Work Groups, advisory committees, Fire Services Code Committee and associations should have identified their 2009 code changes and where possible gain consensus.

June 22, 2009: BHCD's Codes and Standards Committee meet to review non-consensus items at DHCD 1st floor board room 9:30 to 4:00.

July 27, 2009: BHCD Meeting at VDHA at 4224 Cox Road (Innsbrook) 1st floor. Public hearing BHCD and FSB at 9:30, Codes and Standards Committee following hearing at approximately 11:00 to 12:15 and BHCD Board meeting 1:00 to approve the 2009 proposed regulations.

August, September, and October, 2009: No meetings as regulations are approved for publication and 60 days comment period.

November 16th/December 21st, 2009: BHCD's Codes and Standards Committee would meet to review public comments on the proposed regulations, carry-over code changes and new code changes.

January 18th or 25th, 2010: BHCD and FSB hold public hearing on the proposed regulations.

March 1, 2010: Deadline for new code changes.

May 17, 2010: BHCD's Codes and Standards Committee meet to consider all code changes not approved, public comments or any new code changes and a final review of the regulations and approval to submit for the BHCD to approve..

June 21, 2010: BHCD approve final regulations with input from the FSB on the SFPC. Codes and Standards Committee short meeting prior to the BHCD meeting.

September 30, 2010: Effective date of final regulations if approved by the OAG and Governor's Office.

3-9-09

2009 BHCD Regulatory Cycle Schedule and Meetings for the USBC, SFPC, VADR, VCS, MHSR and the IBSR:

March 19, 2009: Work Group 2 Administrative, technical amendments from the 2006 regulations and the SFPC meets

March 23, 2009: BHCD approves the publication of the NOIRA's for each regulation.

March 26, 2009: Work Group 1 Energy meets:

April 2, 2009: Work Group 3 model codes technical amendments meets:

April 9, 2009: Work Group 4 International Residential Code meets:

April 23, 2009: Work Group 1 Energy meets:

April 30, 2009: Work Group 2 Administrative, technical amendments and the SFPC meets:

May 6, 2009: Work Group 3 model codes technical amendments meets:

May 13, 2009: Work Group 4 International Residential Code meets:

May 18, 2009: BHCD's Codes and Standards Committee meets 1st floor board room at DHCD approximately 11:00 to 4:00 following the regular scheduled BHCD meeting.

June 22, 2009: BHCD's Codes and Standards Committee meets 1st floor board room at DHCD at 9:30 to 4:00.:

July 27, 2009: BHCD and Fire Services Board hold public hearing at 9:30, Codes and Standards Committee at approximately 11:00 to 12:15 and at 1:00 the BHCD meets to approve the draft regulations.

Meeting at VDHA in Innsbrook at 4224 Cox Road, 1st floor.

August to October, 2009: 60 day public comment period for the proposed USBC, SFPC and related regulations

November 16th or December 21st, 2009: BHCD's Codes and Standards Committee meets to consider public comments, carry-over code changes from the Work Groups 1-4 meetings and any new code changes.


January 18th or 25th, 2010: BHCD and Fire Service Board hold 2nd public hearing.

March 1, 2010: Deadline for 2009 code changes.

May 17, 2010: BHCD's Codes and Standards Committee meets to consider all remaining code changes and approve the final regulations for submission to the full BHCD.


June 21, 2010: BHCD approve final regulations with input from the FSB.

Effective Date: September 30, 2010





Overview of ICC Activities Related to Energy and Sustainability

Virginia Department of Housing and Community Development
Work Group on Energy Provisions for the 2009 USBC
Richmond, VA
August 28, 2008





Purpose and Expected Outcome

- **Purpose** – to provide an overview of current activities within the ICC related to energy and sustainability
- **Expected Outcome** – the ability for VA DHCD and others in Virginia to consider those activities in addressing energy and sustainability issues through the USBC



Agenda

- The 2009 International Energy Conservation Code
- The energy provisions of the 2009 International Residential Code
- The process leading to the 2010 Supplement and 2012 Editions of the IECC
- Support services and products related to energy
- The ICC Green Building Standard



- Alternative fenestration rating provisions (outcome TBD)
- Increase envelope requirements to yield ~ 30% improvement in efficiency both in code and alternatively in an appendix (TBD)
 - Reduction in SHGC in climate zones 1 to 3
 - Increased R-values
 - New options for insulating basements
- Specific envelope and HVAC equipment efficiency tradeoffs (TBD)
- Sealing of rim joists with bottom plate (TBD)
- New provisions for sealing and air testing of detailed list of criteria validated upon inspection (TBD)

**some are also being considered for the IRC as well*





- Programmable thermostats for forced air furnaces (TBD)
- Limit electricity ratio in furnaces to 2% (TBD)
- Increase minimum R from 2 to 3 for HVAC system hot water piping (TBD)
- Pilot-less ignition for gas water heaters (A)
- Insulate service water heating piping (TBD)
- Auto shutoff for snow melt systems (A)
- Added time switches and covers for heated pools (TBD)
- At least 50% of lamps in permanent lighting fixtures to be high efficiency (TBD)

**some are also being considered for the IRC as well*

- Numerous changes to building envelope provisions (TBD)
- Added separate specific Group R provisions for envelopes (TBD)
- Add roof reflectance provisions for climate zones 1 to 3 (TBD)
- Add provisions for daylighting that allow for more skylights (TBD)
- Add provisions for air barriers in envelope assemblies (TBD)
- Increase HVAC system piping insulation requirements (TBD)



CCP Number	Com. Rec.	Effect of Proposal	On Final Action Agenda
EC 69*	AM	Limit the electricity ratio in furnaces in low rise residential buildings to 2%	Y
EC 71*	A	Add duct sealing verification criteria for low rise residential buildings	Y
EC 74*	AS	Increased minimum R value from 2 to 3 for HVAC system hot water piping in low rise residential buildings	Y

* Also considered for IRC but disapproved

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CCP Number	Com. Rec.	Effect of Proposal	On Final Action Agenda
EC 75	D	Add provisions for insulation of service water heating piping in low rise residential buildings	Y
EC 77	D	Add provisions to limit equipment oversizing in low rise residential buildings	Y
EC 79*	AS	Add requirement for pilotless ignition for gas water heaters in low rise residential buildings	N

* Also considered for IRC but disapproved

INTERNATIONAL CODE COUNCIL

CCP Number	Com. Rec.	Effect of Proposal	On Final Action Agenda
EC 80*	AS	Requirement for automatic shut off of snow melt systems supporting low rise residential buildings	N
EC 82	AS	Added requirement for time switches and covers for heated pools associated with low rise residential buildings	Y
EC 84*	AM	Requires at least 50% of lamps in permanent lighting fixtures in low rise residential buildings to be high efficiency lamps	Y

* Also considered for IRC with same outcome

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CCP Number	Com. Rec.	Effect of Proposal	On Final Action Agenda
EC 106-EC 115		Numerous changes to building envelope requirements for commercial buildings and added group R in commercial building provisions (EC 106 approved others disapproved)	Y
EC 116	A	Add roof reflectance provisions for commercial buildings in climate zones 1 to 3	Y
EC 122	D	Add provisions for daylighting in commercial buildings that allow for additional skylights	Y

INTERNATIONAL CODE COUNCIL

CCP Number	Com. Rec.	Effect of Proposal	On Final Action Agenda
EC 123	D	Add provisions for air barriers in commercial building envelope assemblies	Y
EC 133	AM	Increase insulation requirements for HVAC system piping in commercial buildings	Y
EC 136	A	Add new provisions for fan motors in commercial building HVAC systems	Y
EC 134	A	Add new provisions for HVAC system commissioning and completion in commercial buildings	Y

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CCP Number	Com. Rec.	Effect of Proposal	On Final Action Agenda
EC 147	A	Updates provisions for exterior lighting in commercial buildings to be consistent with the provisions of ASHRAE/IES 90.1-07	N
EC 151	AM	Current section 506 on total building performance alternative deleted and replaced with a new section to make it easier to apply the performance path to compliance for commercial buildings	N
EC 154	D	Same proposal as EC 14 but in appendix so adopting entities have an alternative more rigorous set of provisions to adopt in lieu of those in the code if they so choose	Y

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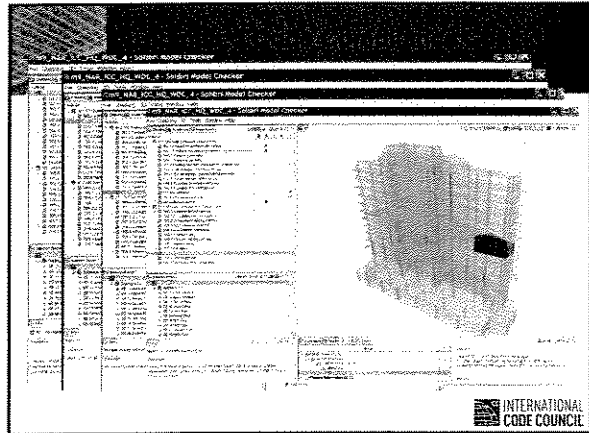
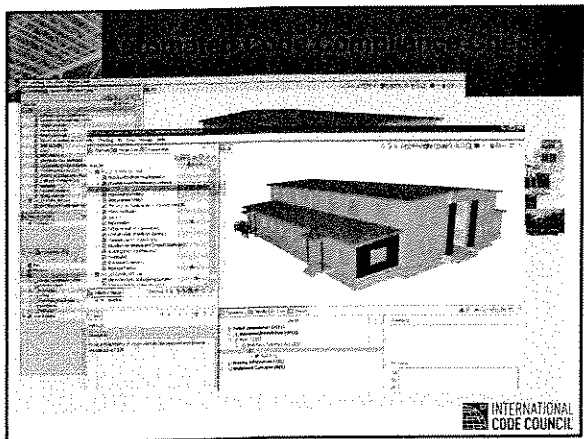
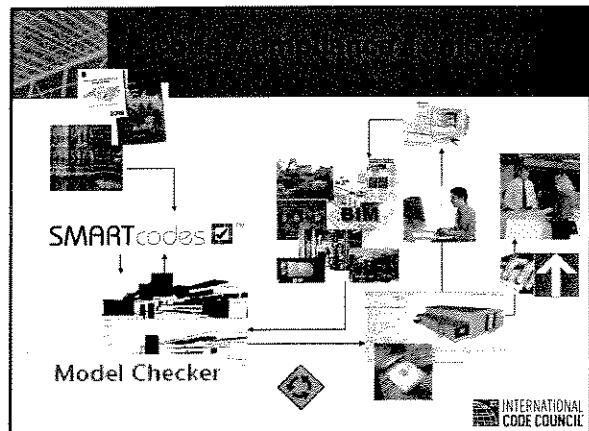
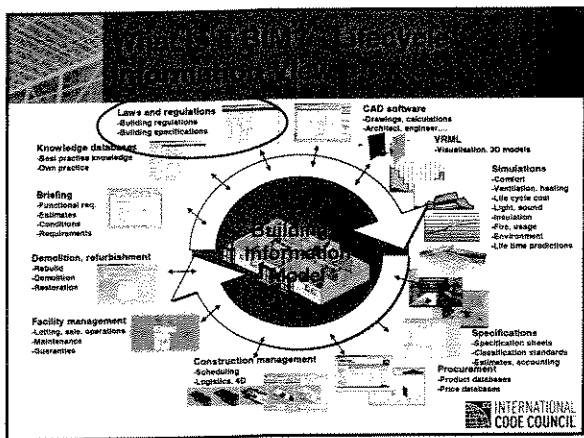
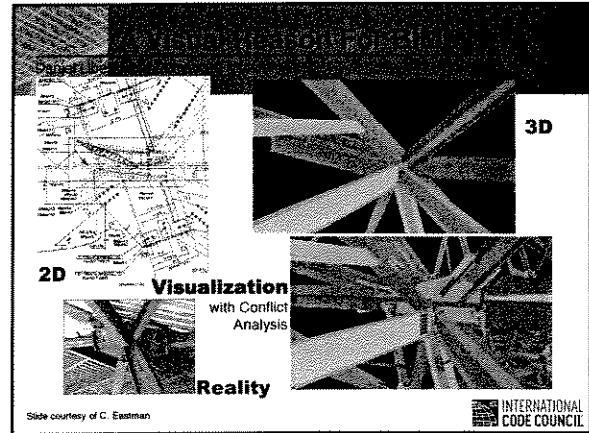
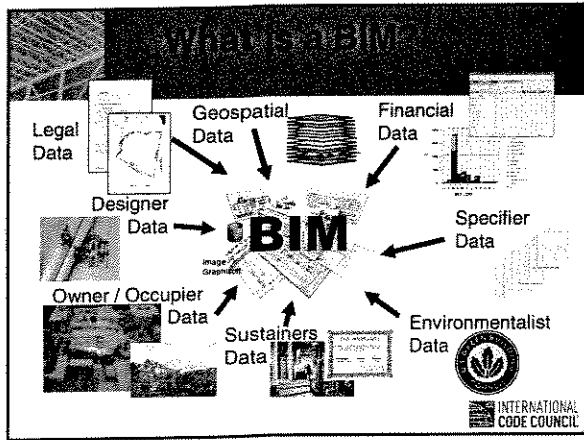


Table 304
Threshold Point Ratings for Green Buildings

Green Building Categories		Performance Level Points ^{1,2}			
		BRONZE	SILVER	GOLD	EMERALD
1.	Chapter 5 Lot Design, Preparation, and Development	35	65	93	119
2.	Chapter 6 Resource Efficiency	45	75	113	145
3.	Chapter 7 Energy Efficiency	30	60	100	120
4.	Chapter 8 Water Efficiency	14	25	41	50
5.	Chapter 9 Indoor Environmental Quality	36	55	100	140
6.	Chapter 10 Operation, Maintenance and Building Owner Education	8	19	11	12
7.	Additional Points from any category	50	100	100	100
Total Points:		221	405	558	687

1. In addition to the threshold number of points in each category, all mandatory provisions of each category shall be implemented.
2. For dwelling units greater than 4,000 square feet, the number of points in Category 7 (Additional Points from any category) shall be increased in accordance with Section 601.1. Total Points shall be increased by the same number of points.

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BRONZE
Requires a minimum energy efficiency increase of 15% and awards 30 points in the Energy category (over 2006 IRC/IECC)

SILVER
Requires a minimum energy efficiency increase of 30% and awards 60 points in the Energy category

GOLD
Requires a minimum energy efficiency increase of 50% and awards 100 points in the Energy category

EMERALD
Requires a minimum energy efficiency increase of 60% and awards 120 points in the Energy category

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A Major distinguishing feature of the NGBS is its application to *existing* residential buildings

- Existing structures make up 90% of housing
- Existing buildings are not addressed by most current residential green building programs
- Renovations and additions are specifically addressed and rated by the NGBS

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Table 305
Threshold Point Ratings for Green Remodels

Green Remodel Practice	Performance Level			
	BRONZE	SILVER	GOLD	EMERALD
Increase in energy and water efficiency as per Section 307.4.4 ⁽¹⁾	25%	50%	75%	100%

(1) See Sections 307.4.1, 307.4.2, 307.4.3 for mandatory compliance requirements.

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Table 303
Threshold Point Ratings for Site Design and Development

Green Subdivision Category		Performance Level Points			
		One Star	Two Stars	Three Stars	Four Stars
Chapter 4	Site Design and Development	79	104	134	175


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- Balanced and diverse interests helped the Consensus Committee ensure
 - Affordability
 - Enforceability
 - Ease of implementation
- Manufacturer and Builder Committee Members
 - Helped keep a perspective on potential costs and ease of implementation

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Choice of Minimum Requirements

- The NGBS has minimum point threshold requirements in each environmental category
- Designers, builders and owners can choose from a multitude of provisions with which to comply, each with corresponding point values
- Very few mandatory requirements that can eliminate design options
- Because point thresholds must be achieved, environmental responsibility is not compromised




The standard allows administration by any Adopting Entity, defined as:

"The governmental jurisdiction, green building program, or any other third party compliance assurance body that adopts this Standard, and is responsible for implementation and administration of the practices herein."




Potential Adopting Entities:

- Governmental Jurisdictions
- Local or National Green Building Programs
- Independent Third Parties



- Where adopted by a jurisdiction, should the NGBS as a whole be administered on a mandatory or voluntary basis?
 - The jurisdiction makes this decision by nature of its adoption
- AHJ decisions: administered in house or by third parties?
 - Plan review?
 - Inspections?
 - Third party involvement for specific verifications only? (such as energy related evaluations and/or testing)
- Incentives to builders/owners?
- GB assistance or education by AHJ? (Alternative materials and methods)




Principles

The NGBS rates potential environmental impact in accordance with principles related to

- Land Conservation
- Water Conservation
- Material Resource Conservation
- Energy conservation
- Indoor and outdoor air quality.

Promotes owner education regarding Green Building

- Operation
- Maintenance





Multiple Threshold Levels Promote High Performance Buildings

- Bronze
- Silver
- Gold
- Emerald

Each Threshold Level has separate point requirements for



- Land
- Water
- Material Resources
- Energy
- Indoor Air Quality
- Owner Education






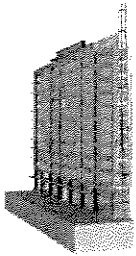


Green Building

- Building high performance/energy efficient building envelopes
- Using energy efficient luminaries, appliances, and heating and cooling systems
- Sealing ducts, building envelopes, including weather stripping and added insulation
- Using whole house ventilation and ceiling fans
- Using low VOC and emitting materials
- Installing MERV air filters




To view Draft Standard #2 of the ICC700-2008 National Green Building Standard, visit :

www.nahbrc.org/technical/standards/greenbuilding.aspx



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* First and foremost: The most contemporary state technical assistance reports may be accessed at: http://www.energycodes.gov/implement/baseline_studies.stm . With time, as Tom notes, this could be more thoroughly compiled (within a wk) to the satisfaction of the transition team.


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impacts final.pdf


Vermont_rpt.pdf

1. Significant changes to the 2009 IECC:

The single most effective improvement to Residential efficiency:

- An approved code change submitted by DOE, EC71-07/08, requires pressure testing in residential construction to verify duct and whole house air sealing. This change alone is estimated to reduce energy consumption in new American homes by an average of 8 to 12 percent. Of course, additional approved proposals raise this savings number. Wide regional variability, uncertainty in technology penetrations estimates, and other variables make the number difficult to pinpoint.

Additional approved changes with major impact:

- Updated reference for commercial buildings to recognize ASHRAE Standard 90.1-2007 as a “deemed to comply” approach equivalent to the commercial provisions of the 2009 IECC.
- EC84-07/08 - At least 50% of installed lighting must be as efficient as compact fluorescent lights.
- EC18-07/08 - Vertical fenestration U-factor requirements are reduced from 0.75 to 0.65 in climate zone 2, 0.65 to 0.5 in climate zone 3, and 0.4 to 0.35 in climate zone 4.
- EC22 and 26-07/08 - The maximum allowable solar heat gain coefficient is reduced from 0.40 to 0.30 in climate zones 1, 2, and 3 (i.e., “the South”, “the Sunbelt”).

Other notable approved changes:

- EC28-07/08 - R-20 walls in climate zones 5 and 6
- EC33 and 36-07/08 - Modest basement/foundation insulation improvements
- EC74-07/08 - R-3 pipe insulation on hydronic (boiler-radiator-type) systems (increased from R-2)
- EC64-07/08 - Improved air-sealing language
- EC80-07/08 - Snow melt controls
- EC81/82-07/08 - Pool covers

2. What is the incremental cost of building a home to the 2009 IECC, and what lifetime payback be (either percentage, or actual dollar cost)? (DOE lists an amount for Phoenix in this fact sheet): <http://www.epa.gov/cleanenergy/documents/buildingcodesfactsheet.pdf>.

DOE (almost always) requests Pacific Northwest National Laboratory (PNNL) or the National Energy Technology Laboratory (NETL) to estimate the energy savings, economic impacts, and pollution reduction from adopting IECC and ASHRAE editions ... The attached report addresses the impacts for “residential buildings” only ... this means “IRC Buildings”, one- and two-family dwellings, townhomes, and condominiums (3 or more attached units) 3-stories or less in height.

The essence: ((as recently as Jan 2008 ... Don’t let the “date” on the report fool you, it’s release was timed so as not to embarrass DOE EERE for failing to issue a Determination on the 2003 and 2006 IECC’s in the ECPA EAct ’92 allotted time frames))...

DOE's own analysis ((as supported by the best at its EERE sub-contracted national building science laboratories)) indicates that homes built to meet the 2006 IECC requirements will save homeowners in the largest Climate "swaths" of the country money – (the changes noted apply to Climate Zones 4, 5 and 6 ... see IECC Table 301.1 ... measureable effects applicable to other Climate Zones are not included) – by reducing long-term energy costs by far more than the construction-related cost increases.

Homeowners with a typical mortgage should realize a net positive cash flow within a few years or less in most cases. Benefit/cost ratios range from 1.5 to 3.9. The analysis also indicates that a significant improvement in pollution reduction (deferred emissions, i.e., fossil-fuel-burning cars taken off the road) can be achieved over time as more and more buildings are built to the code. ((In fact, the State of Texas and the Energy Systems Laboratory designed TX SB 5 entirely around adopting the IECC as a hedge against cities cited by the EPA under "non-attainment" status.)) Construction cost increases and energy savings will vary depending on many factors, including location, fuel prices, house size and characteristics, material and labor costs, and the energy efficiency measures used to comply with the 2006 IECC.

3. **Our contact is looking for similar information, either on national basis, or something that could be extrapolated- like a percentage.**

((These numbers based on 2006 IECC in the Midwest (IL) and the Northeast (VT) are what DOE EERE and PNNL call "qualitative analyses" (a.k.a., not diggin' in the weeds, but close enough for government work). By all accounts, taking DOE's own words http://www.energycodes.gov/news/items/icc_decisions.stm and NEEP's solid analysis www.neep.org ... by my estimation, your contact could apply the "percentages" cited by Rodgers above to arrive in the ballpark of 2009 cost-effects with reasonable certainty.))

Cost effects:

((citing DOE's own study)) The analysis used to determine the cost effectiveness of adopting the 2006 IECC in Climate Zones 4, 5 and 6 requires information on cost increases in (1) insulation, (2) window measures, (3) duct sealing an insulation, and (4) improved furnace efficiency. Estimating construction costs is the most difficult and uncertain step in assessing the cost effectiveness of energy codes. Costs can vary greatly depending on the builder, subcontractors, and materials and equipment suppliers. Costs may decrease after the market adapts to the code requirements and the energy-efficient products required by the code become prevalent. The costs reported here include the builder's profit and represent the sales value of the house.

Insulation measures:

Above-grade wall insulation increases from R-13 to R-19 were obtained from R.S. Means (2004) and are \$0.38/ft² for the increased framing thickness and \$0.10/ft² for the thicker insulation. The 2006 IECC requires R-30 floor insulation in most of Climate Zones 4, 5, and 6, whereas the current practice

is assumed to be R-13. R.S. Means reports an incremental installed cost of \$0.33/ft² for R-30 floor insulation compared to R-19 and \$0.16/ft² for R-19 compared to R-13. For ceiling insulation, R.S. Means reports \$0.18/ft² for the improvement from R-30 to R-38.

Window measures:

A Building America team member estimates typical cost increases of \$300 per house for windows meeting Energy Star (U-0.35 in cold climates) ratings (Edminster et al. 2000). The Northwest Energy Star Window Project reports an incremental retail cost of \$0.89/ft² from seven manufacturers to improve windows from U-0.44 to U-0.34 (Quantec 2002). A recent report from California suggests a \$0.15/ft² incremental cost for manufacturing low-E windows (PGE 2006).

Duct sealing/insulation measures:

A cost of \$800 (obtained from R.S. Means 2004) was assumed to insulate ducts. A study commissioned for the California energy code found that the estimated cost for improved duct sealing is between \$100 and \$150 (California Energy Commission 2000).

Improved furnace efficiency:

A 90% (or higher) annual fuel utilization efficiency (AFUE) condensing furnace is a substantial improvement in efficiency over a “standard” furnace with an efficiency of about 80%. Condensing furnaces have gained significant market share in recent years, increasing from 28% in 2002 to 34% nationwide in 2005 (<http://www.gamanet.org/gama/stats.nsf>). A Wisconsin survey reported that 85% of furnace sales in 1996 in Wisconsin were at the 90%+ efficiency level (Energy Center of Wisconsin 1997). This same study indicated that the average cost of improving from a standard efficiency furnace to the 90% efficiency condensing furnace was \$464. California data gives an incremental equipment cost of \$659 for an 80 kBtu/hr 90% AFUE gas furnace (Itron 2005). A Midwest builder reported the cost at \$500 (Energy Design Update 1998). Table 4.1 summarizes these construction costs for energy efficiency measures required by the 2006 IECC.

Table 4.1. Construction Costs (Incremental Relative to Current Practice) for IECC Energy Efficiency Measures

	Chicago – Prescriptive Option		Chicago – High Efficiency Furnace		East St. Louis	
	Unheated Basement	Heated Basement	Unheated Basement	Heated Basement	Unheated Basement	Heated Basement
Ceiling	\$216	\$216	\$216	\$216	\$216	\$216
Wall	\$951	\$951	0	0	0	0
Window U-factor	\$357	\$357	\$357	\$357	\$357	\$357
Floors Above Unheated Basements	\$588	0	0	0	\$192	0
90% Efficient Gas Furnace	0	0	\$600	\$600	0	0
Duct Insulation	\$800	0	\$800	0	\$800	0
Duct Sealing	\$150	0	\$150	0	\$150	0
TOTAL	\$3062	\$1524	\$2123	\$1173	\$1715	\$573

The option of complying with the IECC with a 90% efficient natural gas furnace is shown in Table 4.4.

Table 4.4. Annual Energy Cost and Savings from Compliance with IECC – High Efficiency Furnace Trade-Off

	Chicago					
	Unheated Basement			Heated Basement		
	Heating	Cooling	Total	Heating	Cooling	Total
IECC	\$860	\$96	\$956	\$1193	\$103	\$1296
Current Practice	\$1301	\$127	\$1428	\$1406	\$124	\$1530
Total Savings	\$441	\$31	\$472	\$213	\$21	\$234
Percent Savings	34%	24%	33%	15%	17%	15%

Economic Impacts Accounting for Mortgages for a home that complies with the 2006 IECC. Mortgages spread the payment for the cost of a house over a long period of time. In this analysis, a fixed-rate mortgage was assumed. Homebuyers will deduct the interest portion of the payments from their income taxes. The financial and economic parameters required for input to this analysis are summarized below:

New-home mortgage parameters:

- 7.0% mortgage interest rate (fixed rate DEC 2008 at 5.2 percent so savings will be somewhat less)
- Points and loan fees equal to 1.6% of the mortgage amount
- 30-year loan term
- 10% down payment.

Other rates and economic parameters:

- 7.0% nominal discount rate (discount rate DEC 2008 at 5.2 percent so savings will be somewhat less)
- 28% marginal federal income tax, 3% state income tax
- 1.5% property tax
- 3% nominal inflation for fuel prices
- 30-year analysis period, no residual/salvage value

Table 4.5 shows the impacts to consumers' cash flow resulting from IECC compliance (for convenience, the analysis for Chicago and East St. Louis, IL are selected). The upfront costs include the down payment, points, and loan fees. The savings from income tax deductions for the mortgage interest will slowly decrease over time. The annual values shown in the table are for the first year. The net annual cash flow includes energy costs, mortgage payments, mortgage tax deductions, and property taxes but not the up-front costs.

Table 4.5. Impacts to Consumers' Cash Flow from Compliance with IECC

	Chicago				East St. Louis	
	IECC Prescriptive Option		High Efficiency Furnace Option		IECC Prescriptive Option	
	Unheated Basement	Heated Basement	Unheated Basement	Heated Basement	Unheated Basement	Heated Basement
Up-Front Costs	\$343	\$171	\$238	\$132	\$192	\$64
Annual Energy Savings	\$446	\$161	\$472	\$234	\$292	\$49
Annual Mortgage Increase	\$230	\$114	\$159	\$88	\$129	\$43
Annual Income Tax Deduction Increase	\$63	\$31	\$43	\$24	\$35	\$12
Annual Property Tax Increase	\$43	\$22	\$30	\$16	\$25	\$8
Net Annual Cash Flow Savings (excluding up-front costs)	\$232	\$57	\$340	\$161	\$182	\$10
Benefit/Cost Ratio	2.6	1.8	3.9	3.5	3.0	1.5
Net Present Value Savings	\$4534	\$1190	\$6004	\$2846	\$3266	\$242
Time to Net Positive Cash Flow	1.5 years	3 years	0.8 years	0.9 years	1.1 years	6 years

All results discussed in previous sections have been at the individual house-by-house level. In Table 4.6, the results are aggregated to a statewide total. The results for the prototype houses in Chicago and East St. Louis were combined to obtain an estimated state average. The Department of Census data on building permits reports that about 67,000 residential units were built in 2005 (U.S. Census Bureau 2006).

Table 4.6. Aggregate Statewide Impacts from Compliance with IECC

	Annual	Cumulative	
		2010	2020
Energy Cost Savings	\$24.0 Million	\$144 Million	\$2.2 Billion
Electricity Savings	37 Million kWh	220 Million kWh	3380 Million kWh
Natural Gas Savings	1720 GBtu	10340 GBtu	157 TBtu
SO ₂ Reduction (tons)	304 tons	1823 tons	27,600 tons
NO _x Reduction (tons)	190 tons	1141 tons	17,300 tons
CO ₂ Reduction (tons)	141,000 tons	847 thousand tons	12.8 million tons

Assumptions cited in DOE/PNNL's analysis are cited in Section(s) 3.0 and 4.1 of both the IL and VT reports. **It is important to stress that the energy savings from the code requirements will only be achieved through full and thorough enforcement of the code.** For example, if duct sealing practices are not improved, the estimated annual savings decrease by one-third on a statewide level.

4. How many building officials would need to be trained, in order to achieve a level of competence to have compliance with the 2006 or 2009 IECC across the country? How many per jurisdiction, and how would you measure competence (for example, Certification as an ICC Residential Energy Inspector.)

*Answer to this is in Rosenfeldt's and Van Kampen's court vis a vis Armstrong. However, having provided the staff support to the IECC Energy Test Development Committee since inception in 1997, I'd recommend using prevailing "pass-fail" rates multiplied times a state-by-state membership population assumption to arrive at an overall number (e.g., if IL State-wide governmental membership consists of say 100 members, and the 2007-08 "pass-fail" for RES ENERGY INSPECTOR exam is 57%, then $100 * 57 =$ a "pass/fail" rate of 57 regulators or better would be "deemed a success" for the program.) Do this for each state in the union and DON'T FORGET U.S. territories, Guam, Mariana Islands, Virgin Islands and Puerto Rico. Also, don't forget that there are three exams: RES ENERGY INSPECTOR, RES ENERGY PLAN RVWR, and COM'RCL ENERGY PLN RVWR/INSPECTOR. *** If such a program were established for the country, I'd recommend consolidating the RES exams into one (if it hasn't already) for sake of economies of scale.*

5. How long would it take to train and certify an energy inspector, and what would the cost to the jurisdiction be, including travel and training expenses.

Answer to this is in Rosenfeldt's and Van Kampen's court vis a vis Armstrong.

6. Would there be significant resistance to requiring states to adopt the 2009 IECC, as a condition of receiving building energy retrofitting funds, with the building market in its current slump?

The building sector represents 40 percent of the nation's primary energy consumption – 72 percent of electricity and 55 percent of natural gas – exceeding any other sector of the U.S. economy,

including transportation and industry (Energy Information Administration, Annual Energy Outlook 2008, March 2008, Table A2). In 2007, GHG emissions from the built environment were 2,317 million metric tons or 39 percent of total U.S. emissions (Energy Information Administration, Annual Energy Outlook 2008, March 2008, Table A18). Unlike automobiles whose life is comparatively short, buildings can last for decades. The median lifetime for commercial buildings is 65-80 years. EERE estimates that an additional two million new buildings will be built between now and 2010, depending on economic conditions (EERE estimate based on information in Energy Information Administration Annual Energy Outlook 2008, March 2008, Tables A5 and U.S. Department of Energy buildings data book, Table 2.2.5).

If the 2006 IECC was adopted and applied in all 50 states, the country could save up to 6.6 quadrillion BTUs of energy over the next twenty years, while eliminating more than 100 million metric tons of carbon equivalent emissions (a.k.a., fossil-fuel-burning vehicles off-the-road). Using the 2009 version would increase this savings by 18-22% ("The ICC is currently considering code proposals that have the potential to improve the residential code by 18 to 22 percent when the next IECC update is published in 2009." Statements of David Rodgers, Deputy Assistant Secretary, Office of Energy Efficiency and Renewable Energy, US DOE – before the Committee on Energy and Commerce, Subcommittee on Energy and Air Quality, US House of Representatives, July 17, 2008

http://energycommerce.house.gov/index.php?option=com_content&task=view&id=1361&Itemid=95). So the energy savings and deferred emissions attributed to the building sector through code enforcement are on a massive scale, and the savings are permanent.

(<http://www.epa.gov/cleanenergy/documents/buildingcodesfactsheet.pdf>)

Still, all of the above is merely playing games with numbers and words. Something has to be done to incentivize the HBA. I happen to like the approach laid out simply in the The 2030 Challenge Stimulus Plan <http://www.architecture2030.org/downloads/2030stimulusplan.pdf>.

Because investing in energy efficiency in buildings is the most effective way to create jobs and revive the economy, Architecture 2030 recommends an investment of \$171.72 billion (\$85.86 billion each year for two years) in a plan that integrates a residential mortgage buy-down and an accelerated-depreciation program for commercial buildings with energy efficiency in buildings, specifically with the widely adopted energy reduction plan called the 2030 Challenge (which cites use of building energy codes and the 2009 IECC at its core).

The investment is projected to create **3.75 million direct jobs in the Building Sector, as well as 4.34 million indirect and induced jobs and over 350,000 jobs from consumer spending.**

Of special note, tying the mortgage buy-down and accelerated depreciation to achieving specific energy reductions immediately creates the opportunity for a \$1.6 trillion renovation market that does not currently exist. The immediacy and magnitude of this opportunity can turn the tide for the construction industry, as well as the nation.

The plan, called the 2030 Challenge Stimulus Plan ('Plan'), would save consumers \$142.33 billion to \$200.88 billion in energy costs and mortgage payments over a five-year period, significantly reducing the risk of mortgage failure while increasing disposable income. Because the 2030 Challenge calls for buildings to be renovated or designed to reduce their fossil-fuel, GHG-emitting energy consumption in a range from 30% below that required by the IECC 2006 (8-10% below that

required by the 2009 IECC) to carbon neutral, the Plan will also reduce CO2 emissions by 481.13 MMT and energy consumption by 6.17 QBTU over the same five-year period.

7. What Is the Role of Non-Attainment and regulatory professionals in the preservation of general public welfare, energy independence, and its impact on human health and quality of life in our largest cities?

By maintaining the general welfare of the public through energy code enforcement it turns out first preventers (code officials) effect change in our local economies and climate. Through the cooperative enforcement of energy conservation codes the U.S. building regulatory community works to improve public health in our towns and cities, albeit indirectly through reductions in incidents of heat stroke, heat- and respiratory-related stress intensified by ground level ozone (i.e., smog) produced by consuming fossil-fuels to heat, cool and illuminate the buildings we live, sleep, eat, work and play in.

What was the Role of energy codes and non-attainment in the most populous and affected Counties in Texas?

- 70% of state's population
- 76.4% of aggregate employment
- 83.4% of personal income
- 83% of Gross State Product
- 85% of Texas manufacturing activity

(Data Source: The Perryman Group. *The Importance of Maintaining A Proper State Implementation Plan (SIP) to Address Air Quality Issues in Texas: An Economic and Fiscal Impact Assessment*. November 2002.)

What was the projected cost of failure (i.e., in Health Effects on the cost of doing business in Texas)?

"Low" Scenario

- \$6.3 billion in Total Expenditures
- \$3.2 billion in Gross Product
- \$2.2 billion in Personal Income
- 56,356 Permanent Jobs
- \$157.4 million in State Revenue

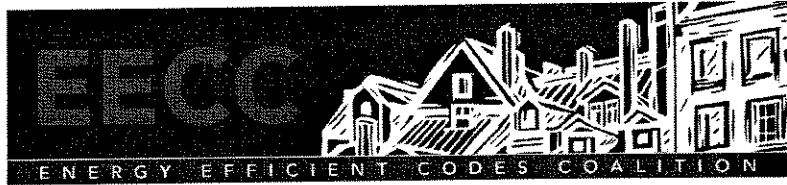
"High" Scenario

- \$13.7 billion in Total Expenditures
- \$7.0 billion in Gross Product
- \$4.8 billion in Personal Income
- 123,763 permanent Jobs
- \$345 million in State Revenue

In exercising duties as regulatory professionals, the preservation of general public welfare in modern construction codes is a purpose often forgotten, but equally as important to structural- fire- and life-safety in a nation—a world—increasingly focused on energy independence, energy security and its impact on human health and the quality of life in our largest cities. Consider these tenets that have renewed national interest *first* by requiring effective, fundamental energy code enforcement as the baseline level of performance for state and local government, before committing to any "above code" programs (i.e., LEED Ratings, Green Globes, EPA Energy Star or equivalent.).

- Energy consumption creates effects beyond the boundaries of the local government within which the energy is consumed because the production of power occurs in centralized locations.
- Emissions from energy consumption affect the health of citizens locally (e.g., reduced incidents of heat stroke, heat and respiratory stress, ozone-action days, incident asthma hospitalization, etc.).
- The strain on the electrical grid from peak electric power demand is not confined to jurisdictional boundaries.
- There is local, statewide and national interest in the reliability of the electrical grid and an adequate security in the supply of heating oil and natural gas.
- Controlling energy costs for residents and businesses furthers local, statewide and national interests in a strong economy and reducing the cost of housing.

Energy & Cost Savings Analysis of 2009 IECC Efficiency Improvements



*As Adopted by the ICC
September 22, 2008*

www.thirtypercentsolution.org

An Analysis Prepared for the Energy Efficient Codes Coalition (EECC) by ICF International

Executive Summary

Although it won't fully realize the 30% improvement sought by the Energy Efficient Codes Coalition, the recently-completed 2009 International Energy Conservation Code (IECC) represents a substantial – and some argue, unprecedented – boost in the energy efficiency of new home construction and renovations over the 2006 IECC. **ICF International's analysis estimates that homes built to the 2009 IECC standards will save 12.2% under the simple "prescriptive" method and could save 14.7% or more using the more complicated "performance-based" method.**

Perhaps as significant as the numerical results, a clear majority of International Code Council voting members present at the Final Action Hearing consistently supported energy efficiency improvements, including "The 30% Solution" (EECC's comprehensive package addressing virtually all energy-related aspects of home construction) and EECC's proposal to establish the IECC as the nation's *only* model energy code. Although both proposals fell a few votes shy of the two-thirds majority needed for final approval, **this impressive support suggests that future IECC efficiency improvements will enjoy substantial support from the ICC membership.**

How much energy will the improvements to the IECC save? How close does it come to the 30% goal sought by many government officials and the EECC for 2009?

Different experts' estimates of energy savings from the recent improvements vary, depending on the level of detail of their analysis and the assumptions made. For example, the US Department of Energy called ICC's Final Action Hearings "a home run," adding that "residential experts suggest the 2009 IECC will be at least 15 percent and possibly even 18-20 percent more energy efficient than its 2006 predecessor."

Because we felt a comprehensive assessment would add more clarity to this important question, EECC asked ICF International – a leading professional services firm – to conduct a thorough analysis of the energy cost savings that might reasonably be expected if the 2009 IECC were adopted and enforced. ICF's residential energy efficiency team combines building science and computer simulation expertise with home building industry field experience to calculate the

energy and economic impacts of advanced home design and construction technologies. The firm's methodology and assumptions are described below.

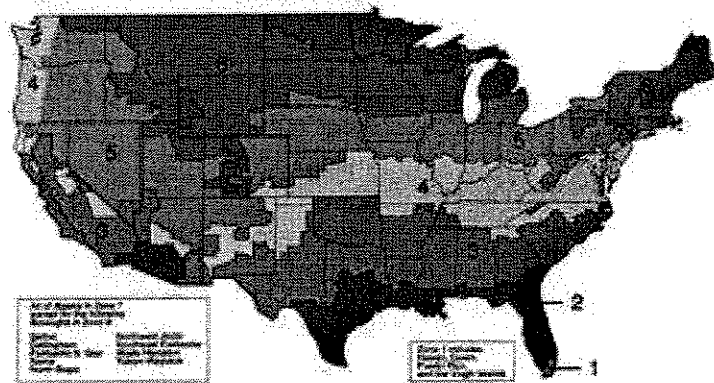
ICF estimates nationally-weighted "hard" savings of 12.2% under the 2009 IECC's Prescriptive Path and savings that could exceed 14.7% or more for a new home using the Performance Path

Homeowner Energy Cost Savings Average \$235/Year

If the 2009 IECC were adopted and enforced for new homes constructed throughout the US, ICF's analysis estimates national energy cost savings of 12.2% and average weighted energy cost savings to the new homeowner of \$235 per year (using 2007/2008 EIA cost data by state). It should be noted that these costs likely substantially understate actual cost savings because they do not incorporate expected increases in energy prices over the life of the home. By Climate Zone, the estimated energy savings range from 9.5% -14.1% and the energy cost savings range from \$163-\$437 per home, as follows (ICF used energy cost savings as the metric to be consistent with how the IECC measures energy savings):

Nationally Weighted	By Climate Zone								
	1	2	3	4	4 Marine	5	6	7	8
12.2%	14.1%	13.2%	13.4%	11.6%	9.5%	10.0%	11.6%	13.1%	13.3%
\$ 235	\$ 437	\$ 223	\$ 242	\$ 238	\$ 163	\$ 221	\$ 276	\$ 337	\$ 419

In an effort to shorten the IECC, make it easier to use and employ a common map for both commercial and residential codes, the 2006 IECC reduced climate zones to eight in number. The simpler map replaced many pages of maps and commercial envelope tables and allowed IECC users to easily determine the requirements that apply anywhere in the US. The new IECC Climate Zone map is shown to the right (Hawaii, Guam, Puerto Rico and the Virgin Islands are in Climate Zone 1; Alaska is in Climate Zones 7 and 8).



What Are the 2009 IECC Improvements Included in ICF's

Energy Cost Savings Estimates for the Prescriptive Path?

ICF included the following energy-saving provisions that adopted at the IECC Final Action Hearings in Minneapolis on September 21-22:

More Efficient Windows & Doors

- ✓ Vertical window U-factors reduced from 0.75 to 0.65 in climate zone 2, from 0.65 to 0.50 in Climate Zone 3, and from 0.40 to 0.35 in Climate Zone 4 (EC-18)
- ✓ Maximum allowable solar heat gain coefficient is reduced from 0.40 to 0.30 in Climate Zones 1, 2, and 3 (EC-26)
- ✓ Door U-factor exemption limited to one side-hinged opaque door assembly up to 24 square feet in area (EC-58)

More Efficient Lighting

- ✓ At least 50% of installed lighting fixtures to use technologies at least as efficient as compact fluorescent lights (EC-84)

Increased Insulation

For walls:

- ✓ R-20 wall insulation in Climate Zones 5 and 6 (EC-28)

For Foundations and Basements:

- ✓ Increased basement wall insulation in Climate Zones 6-8 to R-15/19 (EC-33)
- ✓ R-5/13 insulation for most Climate Zone 3 basements (EC-36)
- ✓ Heated slab insulation is lesser of 2 feet or depth of footing in Climate Zones 1-3 (EC-37)

For Floors:

- ✓ Increased floor insulation in Climate Zones 7-8 to R-38 (EC-35)

For Ceilings (with and without attics):

- ✓ Limit on cathedral ceiling exemption to 500 square feet or 20% of total insulated ceiling area, whichever is less (EC-46)

For Circulating Hot Water Systems:

- ✓ Increased insulation on mechanical system pipe distribution systems to R-3 (EC-74)

Envelope and Duct Air Leakage Testing

- ✓ Requires either a visual inspection of the thermal envelope components or a blower door test at 7 ACH at a pressure of 50 pascals (EC-64)
- ✓ Ensured limited air duct leakage, by requiring duct testing or location of the air handler and all ducts within the conditioned envelope (EC-71)

Performance Path Changes Add to Potential Savings

The IECC offers designers and builders both “prescriptive” and “performance” paths to comply. The prescriptive path prescribes specific energy efficiency levels that must be met for each component of the new home —insulation, windows, etc. While there are simple ways to trade efficiency among envelope components, the prescriptive path generally establishes a simple recipe (or prescription) for designers and builders to follow. The performance path, on the other hand, requires a more detailed analysis of the home’s energy use, but permits more choices for trading off various aspects of building performance to achieve the required level of energy

efficiency. Under the performance path, the proposed home is compared to a code-specified baseline standard reference design for a home of the same size to determine if the proposed home will have energy costs no higher than the reference design.

Buildings constructed under the 2009 performance path will achieve most of the same increased savings as under the 2009 prescriptive path, since the prescriptive path improvements generally also serve to improve the baseline reference home under the performance path. In addition, in the 2009 IECC, the performance path was specifically tightened up. As a result of these improvements, depending on the home design, homeowners may see savings over the previous code by 15% or more.

The 2009 IECC Lowers the Performance Path's Assumed Window Area to No More Than 15%

Previously, the performance path based the reference home on an assumption of a maximum 18% window area as a percentage of the home's conditioned floor area. By reducing the assumed maximum percentage to 15%, the energy usage of the reference home is reduced by about 2.5%. This means that any home designed in compliance with the performance path that would have used 18% or more windows will be required to use about 2.5% less energy (for homes with less than 15% window area, this change will have no effect; for homes between 15% and 18% the savings will be less than 2.5%).

The 2009 IECC Also Eliminates Trade-offs of Mechanical Equipment (Heating, Cooling and Hot Water) in the Performance Path

In the 2009 IECC, the ICC voted to eliminate trade-offs of building envelope efficiency (e.g. insulation and windows) for efficiency gains in heating and cooling equipment in the performance path. Such trade-offs were already prohibited under the prescriptive path.

For example, under previous IECC versions, builders could claim trade-off "credit" for installing high-efficiency furnaces or other more efficient equipment, by installing less insulation or less-efficient windows, even though those furnaces already account for a substantial part of the U.S. market, and a majority of the market in colder states. To make matters worse, states are preempted by federal law from requiring equipment efficiency that exceeds the federal minimum efficiencies. In other words, builders could build homes that were less efficient than they should be, by taking credit for the efficiency of equipment that would most likely have been installed anyway, while a state is powerless to set more reasonable equipment efficiencies suitable to its climate zone. Eliminating such tradeoffs effectively closed a major "loophole" in the IECC.

Example: How the Elimination of Mechanical Trade-Offs Boosts Energy Savings in the Performance Path

The elimination of mechanical equipment trade-offs is one of the most significant improvements made to the 2009 IECC. Here's one example of how this change will boost new home energy efficiency:

- Under the 2006 IECC, installing a 90% AFUE (Annual Fuel Utilization Efficiency) furnace in a home with 18% window area would give the builder using the Performance Path an average 7% trade-off allowance that could result in the installation of other less efficient insulation, windows or other measures (*the trade-off allowance ranges from 0.1% in Climate Zone 1 to 11.1% in Climate Zone 8*). The impact would be even greater for a more efficient furnace and there would also be a substantial trade-off allowance if more efficient air conditioning and hot water heating equipment were installed.
- Under the 2009 IECC, using a performance path home with 18% glazing, the average 7% boost in energy savings from the 90% AFUE furnace – rather than traded away with reduced insulation or other envelope features – would be added to the weighted average savings of 12.2% for the Prescriptive Path *AND* 2.5% for the reduced window area to result in a new home that is **21.7% more energy efficient than an average home meeting the 2006 IECC**.

Energy and Cost Savings Estimates Necessarily Depend on Assumptions . . . The Vital Role Accurate and Thorough Assumptions Play in ICF's Building Code Analysis



In order to provide stakeholders with accurate, technically-credible estimates of energy cost savings from the efficiency improvements approved at the Final Action Hearings for the IECC (*the IECC uses energy cost as the metric for comparing energy efficiency*), IECC selected ICF International to conduct our analysis. A review of the extensive spectrum of factors listed below that ICF incorporated into its analysis attests to the firm's thoroughness and technical rigor.

Although the numbers included in the ICF analysis are precise, it should be kept firmly in mind that the numbers are simply estimates based on an extensive array of assumptions about energy prices, new home starts within climate zones, the physical details of an average home, owner operating practices and many other factors. Of course, specific home savings will vary substantially. ICF's modeling approach examines a broad array of house types, seeking to capture a reasonable representation of the varieties of home construction around the U.S., by examining home with the following range of characteristics:



- 239 TMY2 local climate locations in US
- Three types of foundations: slab, basement & crawl space
- Two building heights: One & two stories
- Two floor areas: 2,000 & 3,000 square ft.

- Four window orientations: northern, southern, eastern & western
- Energy Costs: 2007/2008 Energy Information Agency utility rates by state
- Regional and national results reflect weighting by number of housing starts

The ICF approach also makes the following assumptions regarding its baseline home:

- Three bedrooms
- R-Values, U-Values & SHGC from the 2006 IECC
- Home aspect (width:height) ratio of 2:1
- Insulation installation quality: Grade 3
- R-6 duct insulation
- Duct leakage of 15 cubic feet/minute for each 100 square feet of conditioned floor area
- Air infiltration of 8 ACH50
- Lighting with 10% high efficacy lamps
- Window area is 15% of floor area
- Thermostat settings: 72° heating, 75° cooling
- Interior Shade Fraction: 0.85 winter, 0.75 summer
- HVAC system is 15% over-sized
- Furnace with Average Fuel Utilization Efficiency (AFUE) of 78%
- Air conditioner with Seasonal Energy Efficiency Rating (SEER) of 13
- Heat pump meeting Heating Season Performance Factor (HSPF) of 7.7
- 40-gallon gas water heater with Energy Factor (EF) of 0.594
- Frame Fractions 23% wall, 11% ceiling and 10% floor
- Below-grade basement wall height 6'
- Roof & wall absorptivity of 0.75
- Ducts located in unconditioned space:
 - 100% in 1-story, slab
 - 100% in 1-story, crawlspace
 - 75% in 1-story, basement
 - 75% in 2-story slab
 - 75% in 2-story, crawlspace
 - 65% in 2-story, basement
- Factors: Shielding = .185; Horizontal = .40; Neutral level = .50.

Cost Savings Estimates Would Multiply if Societal Benefits Were Included

For various reasons, this analysis only includes energy cost savings. It does not attempt to include other cost savings (like savings from reduced equipment sizes), much less calculate the *societal* benefits achieved by boosting energy efficiency and reducing energy demand. These benefits are substantial and could significantly influence public policy priorities such as:

- Increasing America's energy security by reducing energy imports and reducing peak electric and gas demand
- Reducing the need for expensive new power plant capacity and gas rigs to meet rising electricity and gas demand
- Reducing emissions of greenhouse gases and other air pollutants
- Reducing or stabilizing energy prices for all Americans, by reducing energy demand in buildings
- Reducing the cost of building materials—moderating energy prices reduce materials manufacturers' energy costs and thus moderate future materials prices.

Conclusion

The energy efficiency of new homes will improve substantially under the nation's 2009 model energy code governing new home construction – the International Energy Conservation Code (IECC) – but will not achieve the 30 percent improvement sought by the U.S. Department of Energy, the U.S. Conference of Mayors, the National Association of State Energy Officials and the broad-based Energy Efficient Codes Coalition (EECC). But after two decades of only modest energy efficiency gains, it's clear that a growing number of building officials are embracing the need for much higher energy efficiency in our codes for new home construction.

Beginning with the new ICC code development cycle that kicks off in April 2009, the EECC will continue to advocate dynamic codes that will eventually take new home construction well beyond a 30 percent improvement. In the near term, the coalition will make its comprehensive package, called "The 30% Solution," available for state and local governments that want to go beyond the 2009 IECC today. In addition, EECC and will work with states to ensure that local elected officials, code officials and builders have the resources they need to do their jobs, and continue to expand our coalition.

About EECC

The Energy Efficient Codes Coalition is a unique, broad-based alliance of longstanding energy efficiency advocates that united to join a growing chorus supporting an ambitious step forward in the energy efficiency of American homes. Its supporters include government, national energy efficiency groups, regional energy efficiency alliances, environmental groups, utilities, affordable housing advocates, architecture, academia/think tanks, energy consumers and businesses, and labor. Together, in 2007/2008 the Coalition developed "The 30% Solution," a comprehensive code change proposal to boost energy efficiency in the 2009 model energy code by 30% over the current IECC, using fully achievable and affordable "state-of-the-shelf" technologies. The Coalition also opposes proposals that either weaken energy efficiency or include industry- or product-specific special exemptions.

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About ICF International

ICF International (NASDAQ: ICFI) partners with government and commercial clients to deliver consulting services and technology solutions in the energy, climate change, environment, transportation, social programs, health, defense, and emergency management markets. Since 1969, ICF has been serving government at all levels, major corporations, and multilateral institutions. ICF combines its expertise in energy policy, building science, and industry knowledge with its unique analytical capabilities to help clients successfully develop policies and programs. ICF has extensive experience assessing energy performance and savings for technologies and buildings. This experience ranges from providing simple assessments, such as spreadsheet calculations, to very detailed energy modeling simulations for the residential, commercial, and industrial buildings sectors. ICF also has extensive experience in creating sophisticated and easy to use software tools for clients to predict the energy and demand savings potential.

**SB 447 Department of General Services; capital outlay projects; another bill?
LEED standards applicable.****J. Chapman Petersen | all patrons ... notes | add to my profiles**

Summary as introduced:

Department of General Services; capital outlay projects; LEED standards applicable to certain buildings. Requires all state-owned buildings that encompass a total of area of over 10,000 square feet to meet the United States Green Building Council Leadership in Energy and Environment Design (LEED) silver certification standard, unless granted an exemption by the Director of the Department of General Services. The provisions of the bill do not apply to construction projects of public school districts.

Full text:

01/09/08 Senate: Prefiled and ordered printed; offered 01/09/08 087981293

Status:

01/09/08 Senate: Prefiled and ordered printed; offered 01/09/08 087981293

01/09/08 Senate: Referred to Committee on General Laws and Technology

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082357504

HOUSE BILL NO. 1137

Offered January 9, 2008

Prefiled January 9, 2008

A BILL to amend the Code of Virginia by adding sections numbered 15.2-961.1 and 36-99.12, relating to the establishment of green roof incentive programs.

Patron-- Fralin-----
Committee Referral Pending

Be it enacted by the General Assembly of Virginia:

1. That the Code of Virginia is amended by adding sections numbered 15.2-261.1 and 36-99.12 as follows:

§ 15.2-961.1. Green Roof Incentive Programs.

Any locality may by ordinance establish an incentive program designed to encourage the use of green roofs in the construction and remodeling of residential and commercial buildings. Such incentive program shall comply with guidelines established by the Board for Housing and Community Development pursuant to § 36-99.12.

As used in this section, "green roof" means a roof of a building that is partially or completely covered with soil and vegetation.

§ 36-99.12. Guidelines for Green Roof Incentive Programs.

The Board shall develop guidelines for incentive programs to encourage the use of green roofs in the construction and remodeling of residential and commercial buildings. Such programs shall include a range of incentives including a special expedited permitting process and guidelines for reduced permit fees.

As used in this section, "green roof" means a roof of a building that is partially or completely covered with soil and vegetation.

Legislative Information System

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088000500

HOUSE BILL NO. 795

Offered January 9, 2008

Prefiled January 8, 2008

A BILL to amend and reenact § 58.1-609.1 of the Code of Virginia, relating to government and commodities sales and use tax exemptions; Energy Star qualified products.

Patron-- Englin-----
Committee Referral Pending

Be it enacted by the General Assembly of Virginia:

1. That § 58.1-609.1 of the Code of Virginia is amended and reenacted as follows:

§ 58.1-609.1. Governmental and commodities exemptions.

The tax imposed by this chapter or pursuant to the authority granted in §§ 58.1-605 and 58.1-606 shall not apply to the following:

1. Fuels which are subject to the tax imposed by Chapter 22 (§ 58.1-2200 et seq.) of this title. Persons who are refunded any such fuel tax shall, however, be subject to the tax imposed by this chapter, unless such taxes would be specifically exempted pursuant to any provision of this section.
2. Motor vehicles, trailers, semitrailers, mobile homes and travel trailers.
3. Gas, electricity, or water when delivered to consumers through mains, lines, or pipes.
4. Tangible personal property for use or consumption by the Commonwealth, any political subdivision of the Commonwealth, or the United States. This exclusion shall not apply to sales and leases to privately owned financial and other privately owned corporations chartered by the United States. Further, this exemption shall not apply to tangible personal property which is acquired by the Commonwealth or any of its political subdivisions and then transferred to private businesses for their use in a facility or real property improvement to be used by a private entity or for nongovernmental purposes other than tangible personal property acquired by the Herbert H. Bateman Advanced Shipbuilding and Carrier Integration Center and transferred to a Qualified Shipbuilder as defined in the third enactment of Chapter 790 of the 1998 Acts of the General Assembly.
5. Aircraft subject to tax under Chapter 15 (§ 58.1-1500 et seq.) of this title.
6. Motor fuels and alternative fuels for use in a commercial watercraft upon which a fuel tax is refunded pursuant to § 58.1-2259.
7. Sales by a government agency of the official flags of the United States, the Commonwealth of Virginia, or of any county, city or town.
8. Materials furnished by the State Board of Elections pursuant to §§ 24.2-404 through 24.2-407.

9. Watercraft as defined in § 58.1-1401.

10. Tangible personal property used in and about a marine terminal under the supervision of the Virginia Port Authority for handling cargo, merchandise, freight and equipment. This exemption shall apply to agents, lessees, sublessees or users of tangible personal property owned by or leased to the Virginia Port Authority and to property acquired or used by the Authority or by a nonstock, nonprofit corporation that operates a marine terminal or terminals on behalf of the Authority.

11. Sales by prisoners confined in state correctional facilities of artistic products personally made by the prisoners as authorized by § 53.1-46.

12. Tangible personal property for use or consumption by the Virginia Department for the Blind and Vision Impaired or any nominee, as defined in § 51.5-60, of such Department.

13. —Expired.]

14. Tangible personal property sold to residents and patients of the Virginia Veterans Care Center at a canteen operated by the Department of Veterans Services.

15. Tangible personal property for use or consumption by any nonprofit organization whose members include the Commonwealth and other states and which is organized for the purpose of fostering interstate cooperation and excellence in government.

16. Tangible personal property purchased for use or consumption by any soil and conservation district which is organized in accordance with the provisions of Article 3 (§ 10.1-506 et seq.) of Chapter 5 of Title 10.1.

17. Beginning September 1, 2004, (i) tangible personal property sold or leased to Alexandria Transit Company, Greater Lynchburg Transit Company, GRTC Transit System, or Greater Roanoke Transit Company that is owned, operated, or controlled by any county, city, or town, or any combination thereof, that provides public transportation services, and/or (ii) tangible personal property sold or leased to any county, city, or town, or any combination thereof, that is transferred to any of the companies set forth in clause (i) owned, operated, or controlled by any county, city, or town, or any combination thereof, that provides public transportation services.

18. (Effective until July 1, 2012) ~~Energy Star-qualified products~~ *Qualified products designated as Energy Star or WaterSense* with a sales price of \$2,500 or less per product purchased for noncommercial home or personal use. The exemption provided by this subdivision shall apply, ~~beginning in 2007~~, only to sales occurring during the four-day period that begins each year on the Friday before the second Monday in October and ends at midnight on the second Monday in October.

For the purposes of this exemption, an Energy Star qualified product is any dishwasher, clothes washer, air conditioner, ceiling fan, compact fluorescent light bulb, dehumidifier, programmable thermostat, or refrigerator, the energy efficiency of which has been designated by the United States Environmental Protection Agency and the United States Department of Energy as meeting or exceeding each such agency's requirements under the Energy Star program. *For the purposes of this exemption, WaterSense qualified products are those that have been recognized as being water efficient by the WaterSense program sponsored by the U.S. Environmental Protection Agency as indicated by a WaterSense label.*